GESTURE SENSITIVE BUTTONS FOR GRAPHICAL USER INTERFACES

This patent application is a continuation of U.S. patent application Ser. No. 07/985,588, filed on Dec. 3, 1992, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates generally to computer systems, and more particularly to graphical user interfaces for computer systems.

Graphical user interfaces or GUI are becoming increasingly popular with computer users. It is generally accepted that computers having graphical user interfaces are easier to use, and that it is quicker to learn an application program in a GUI environment than in a non-GUI environment.

A relatively new type of computer which is well suited for graphical user environments is the pen-based computer system. A pen-based computer system is typically a small, hand-held computer where the primary method for inputting data includes a "pen" or stylus. A pen-based computer system is often housed in a relatively flat enclosure, and has a dual-function display assembly which serves as both an input device and an output device. When operating as an input device, the display assembly senses the position of the tip of a stylus on the viewing screen and provides this positional information to the computer's central processing unit (CPU). Some display assemblies can also sense the pressure of the stylus on the screen to provide further information to the CPU. When operating as an output device, the display assembly presents computer-generated images on the screen.

The dual-function display assemblies of pen-based computer systems permit users to operate the computer as a computerized notepad. For example, graphical images can be input into the pen-based computer by merely moving the stylus across the surface of the screen. As the CPU senses the position and movement of the stylus, it generates a corresponding image on the screen to create the illusion that the stylus is drawing the image directly upon the screen, i.e. that the stylus is "inking" an image on the screen. With suitable recognition software, text and numeric information can also be entered into the pen-based computer system in a similar fashion. Besides serving as a notepad, pen-based computers can provide a number of useful functions, such as serving as an address book, an appointment calendar, a to-do list, etc.

Pen-based computer systems often include "buttons" on their screen which can be "pressed" to perform a desired function or process. These buttons, sometimes referred to as "soft" buttons, are images produced on the screen by the CPU which can be activated by placing the tip of a stylus on the button image in a gesture often referred to as a "tap." Often, upon the detection of a tap, the CPU will change the image of the button to make it appear as if it was "pressed," and then will perform the desired function or process.

Soft buttons provided on computer screens are attractive user interfaces because they emulate the use of well-known buttons controls provided on electric and electronic devices. However, soft buttons have their limitations. For example, prior art soft buttons perform only a single function or process upon activation. Since it is desirable and often necessary to provide a number of different functions to a user, computer screens tend to become littered with button images. This is particularly a problem with pen-based computer systems where the amount of screen area ("screen real-estate") is limited. It is therefore desirable to provide a soft-button functionality for a computer user interface which minimizes the use of screen real estate.

SUMMARY OF THE INVENTION

The present invention provides a gesture sensitive button for graphical user interfaces which is capable of detecting more than one screen gesture. In consequence, a single soft-button can be used to control a number of user functions and processes, thereby conserving valuable screen real estate.

A gesture sensitive button for a graphical user interface in accordance with the present invention includes a CPU, a screen coupled to the CPU, a stylus for pointing to locations on the screen, a soft-button displayed on the screen, and a gesture recognizer for recognizing gestures associated with the button. The button is responsive to at least two different button gestures including a tap gesture and a more complex gesture. Upon the detection of a gesture, the CPU will perform a designated function or process dependent upon which button gesture is detected.

A method for providing a gesture sensitive button for a graphical user interface in accordance with the present invention includes the steps of detecting a gesture made upon a screen of a digital computer by a pointing means, determining whether the gesture is associated with a button image provided on the screen, and initiating one of at least two processes if the gesture is determined to be associated with the button. A gesture is determined to be associated with the button if: (1) it contacts or is physically close to the button; and (2) it is one of the types of gestures associated with that button. One of the detected gesture is preferably a tap gesture, while the one or more additional gestures are more complex gestures such as a "check-mark", an "X-mark", etc.

A major advantage of the present invention is that a single soft-button on a computer screen can be used to control a number of functions or processes. This is particularly advantageous in the context of pen-based computer systems, where screen real estate is often at a premium.

These and other advantages of the present invention will become apparent upon a reading of the following descriptions and a study of the various figures of the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a computer system in accordance with the present invention;

FIG. **2** is a top plan view of the screen, case, and keypad of the computer system of FIG. **1**;

FIG. **3***a* is a view of the status bar shown in FIG. **2** where a "recognize" button has been contacted by a "tap" gesture;

FIG. **3***b* is the view of FIG. **3***a* after the CPU **12** has reacted to the tap gesture;

FIG. **4***a* is the view of FIG. **3***a* where a "check-mark" gesture has been made on the recognize button;

FIG. **4***b* is the view of FIG. **4***a* illustrating the result of the check-mark gesture on the recognize button;

FIG. **5** is a detail view of the recognize button surrounded by a bounding box;

FIG. **6***a* illustrates the engagement of a tap gesture with the bounding box shown in FIG. **5**.

FIG. **6***b* illustrates the engagement of a check mark gesture with the bounding box shown in FIG. **5**;